



2.3 NAVAL SHIPYARDS (NSYs)

The four naval shipyards under the headquarters command of the Naval Sea Systems Command (NAVSEASYS COM) provide the organic industrial base to the Navy for the repair, overhaul, alteration, and modernization of surface ships and submarines of the Fleet. This capability is used primarily to overhaul vessels on a scheduled availability basis to ensure that the highest state of capability and readiness is maintained in the Fleet. The naval shipyards also provide the foundation upon which to mobilize, and are therefore an essential part of the Fleet's readiness for war. Additionally, the naval shipyards perform depot repairable work and serve as engineering planning yards for applicable ship classes.

The extraordinary complex and critical nature of Navy ship maintenance demands that the naval shipyards be centers of technical and production excellence with a comprehensive and diverse industrial capability. Generally, production work is divided into four major functions: structural, mechanical, electrical/electronics, and services, and includes approximately 17 highly skilled trades. Changing Fleet maintenance strategies and increasing sophistication of ship systems require ongoing technological enhancements and productivity improvements in the shipyards.

The four naval shipyards are shown on the map above.

2.3.1 Norfolk Naval Shipyard (NSY), Portsmouth, Virginia

2.3.1.1 OVERVIEW

History

- In 1767, land on the western shore of the Elizabeth River was purchased by Andrew Sprowle, a merchant shipbuilder, and established as Gosport Shipyard under the British flag.
- During the American Revolution, the Virginia patriots confiscated Sprowle's properties.
- While being operated by Virginia, and building two continental frigates, the shipyard was burned by the British in 1779.
- In 1794, Congress passed "An Act to Provide a Naval Armament" and the Federal Government leased the Gosport Shipyard from the State of Virginia.
- In 1798, Congress created the U.S. Navy Department.
- The Gosport Navy Yard laid the keel of the frigate CHESAPEAKE in 1798 and launched it in 1799.
- In 1801, for \$12,000, the Federal Government purchased the shipyard, a tract of land containing 16 acres in the northeast corner of the present shipyard, from the Commonwealth of Virginia.
- In 1827, Congress passed an act for the gradual improvement of the Navy, and construction on one of the first two dry-docks in the United States began at Gosport.
- In 1833, the first dry-dock in the Western Hemisphere, Dry-dock 1, opened by hosting the 74 gun ship-of-the-line, USS DELAWARE. Dry-dock 1 is still in operation today.
- In 1846, the tract of land on the eastern side of the Elizabeth River, known as St. Helena, was purchased for storage and repair.
- When Virginia joined the Confederate States, war seemed imminent in April 1861. Federal forces evacuated and partially burned the shipyard, and the Confederacy then took it over.
- In 1862, the shipyard, know as GOSPORT for nearly a century, was renamed Norfolk Naval Shipyard after the largest city in the area.
- In May 1862, departing Confederate forces burned the shipyard again. Following the war, the shipyard was rebuilt, but no major expansion occurred for nearly 20 years.
- During World War I, the rapidly expanding shipyard's 11,000 employees repaired numerous vessels and constructed four destroyers and 21 110-foot submarine chasers.
- In 1925, a battleship modernization program began, and in 1933, a naval construction program (the National Industrial recovery Act) was initiated. Nine destroyers were constructed and launched by 1939.
- During World War II, the shipyard doubled its physical size and multiplied its productive capacity. From 1940 to 1945, the shipyard worked on 6,850 vessels. One hundred and one new ships and landing craft were constructed, and defense equipment worth millions of dollars was manufactured. At its peak period, the shipyard's employment totaled nearly 43,000 personnel.
- Following World War II, the shipyard became primarily an overhaul and repair facility, and has remained in this status today.
- During the Korean War, the shipyard repaired more than 1,250 naval vessels and builds its last two wooden hull minesweepers.
- In the early part of 1965, the shipyard attained nuclear technology capability when the USS SKATE became the first modern submarine to undergo a major overhaul.
- Today, Norfolk Naval Shipyard provides repair/modernization to the entire range of naval ships including aircraft carriers, submarines, guided missile cruisers and amphibians. Norfolk Naval Shipyard is the oldest continuously operated shipyard in the United States and the only east coast naval shipyard capable of dry docking nuclear aircraft carriers.

- In 1994, the Norfolk Naval Shipyard took the lead in the Regional Maintenance concept with the establishment of the Motor Rewind regional Repair Center (RRC). It was the first RRC in the nation and resulted in the consolidation of 13 Motor Ships in the Mid-Atlantic Region into one facility. Since that time, over a dozen other RRCs have been established which efficiently consolidates the shipyard's resources of skilled mechanics and production facilities and equipment with those of the military personnel and ships forces of the U.S. Atlantic Fleet.
- Currently, regionalization of Navy base operating support functions and claimant consolidation efforts are ongoing. Norfolk Naval Shipyard is an active participant in these efforts.

Mission: The Norfolk Naval Shipyard's primary mission is to repair, overhaul, dry-dock, convert, and modernize ships and to provide logistics services in support of fleet readiness.

Location: The shipyard is located on the southern branch of the Elizabeth River in Portsmouth, Virginia, which is in the southeastern part of the state, known as Hampton Roads. This area includes the cities of Portsmouth, Chesapeake, Norfolk, Suffolk, Virginia Beach, Hampton, and Newport News.

Size:

- The shipyard is composed of several noncontiguous areas totaling 801 acres.
 - The basic industrial area is 498 acres (179 acres in the Controlled Industrial area).
 - There are 6 production shops located in 58 production shop buildings for a total of over 3.3M square feet.
 - Total facility value including the annexes exceeds \$2B.

Work Force/Payroll:

- The end of FY97 civilian work force totaled 6,933 with an annual payroll of \$391.M.
- The end of FY97 military personnel totaled 122.

Transportation Access:

- The Metropolitan Area Highway System provides access to the cities of Norfolk, Portsmouth, Chesapeake, Virginia Beach, Suffolk, Newport News, and Hampton. Major highways include:
 - I-64
 - I-264
 - I-664
 - I-44
 - US 13
 - US 58
 - US 460
- Tunnels joining the cities in Hampton Roads include:
 - Hampton Roads Bridge Tunnel
 - Midtown Tunnel
 - Monitor-Merrimack Bridge Tunnel
 - Elizabeth River Tunnel

- Interconnecting primary state highways supplement major routes.
- Rail service in the Hampton Roads area is excellent
 - The Norfolk and Portsmouth Belt Line Railroad serves the south side of Hampton Roads.
 - Interstate rail service is provided by the Norfolk Southern Corporation and CSX transportation.
 - The surrounding portions of Virginia and North Carolina are served by the Norfolk Southern Corporation, the Chesapeake and Albemarle Railroad Company, and the North Carolina and Virginia Railroad.
- Daily passenger service to Newport News is provided by Amtrak and freight service by Conrail.
- The Norfolk International Airport also serves Hampton Roads. Daily long distance and commuter service is provided by commercial airlines. The facility has complete aviation services, including service for private jets and freight and air express transport.
- There are five DOD airfields in the area, consisting of::
 - Three Navy facilities
 - One Air Force facility
 - One Army facility

Environmental Constraints: The safety, health, and environmental conditions of Norfolk NSY are very good. Communications with the regulatory agencies and elected officials is positive and independent regulatory compliance evaluations are favorable.

- The environment [people and natural resources] at the shipyard is driven by significant federal legislation such as the:
 - Occupational Safety and Health Act (OSHA)
 - Clean Air Act (CAA)
 - Clean Water Act (CWA)
 - Resources Conservation and Recovery Act (RCRA)
 - Toxic Substance Control Act (TSCA)
 - Safe Drinking Water Act (SDWA)
 - Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
 - Pollution Prevention ACT (PPA)
 - Oil Pollution Act (OPA)
 - Emergency Planning and Community Right to Know Act (EPCRA)
- Local legislation requiring compliance exists in some regulatory areas such as underground storage tanks and community right to know information.

2.3.1.2 PLANNED TECHNOLOGICAL ENHANCEMENTS:

N/A

2.3.1.3 COMMODITIES AND PRODUCTS:

Automotive Equipment

Accessories and Components

Armament

Communications

Electronics

Engine

Fire Control

Hull & Chassis

Support Equipment

Construction Equipment

Communications

Electronics

Hull & Chassis

Communications/Electronics

Accessories and Components

Electronics

General Purpose

Support Equipment

Radar

Shelter/Housing

General Support Equipment

Accessories and Components

Machine Tools

Power Plant/Generator Set GTE

Power Plant/Generator Set Recip

Support Equipment

Missile

Support & Launch

Surface Command & Control

Ordnance

Accessories and Components

Engines

Small Arms

Ships

Accessories and Components

Armament

Communications & Electronics

Electrical

Fire Control

General Purpose

GTE Engine

Mechanical

Nuclear Engine

Recip Engine

Steam Engine

Sub-surface Hull

Surface Hull

2.3.1.4 PROCESSES AND TECHNOLOGIES

Cleaning/Stripping

Abrasive Blast

Abrasive Flow

Agricultural Media Blast

Aluminum Antenna Blasting

Asbestos Removal

Chemical

Citric Acid

CO2 Blast

Enzyme Tank

Cleaning/Stripping

Flash Paint Removal

Freon

Glass Media Blast

Grit Blast

Fabrication/Repair

Blade/Vane

Boiler

Cable Assembly

Cable Installation

CAD/CAM

- Artwork-Flat Wire Cables

- Auto Propeller Machining

- CNC & NC Programming

- Drilling/Lathe/Punch

Fabrication/Repair

CAD/CAM

- Engineering Analysis

- Engineering Design/Drawings

- Forming/Machining/Milling

Hazardous Chemicals
Hull Side Blasting
Hydroblast
Mineral Grit Blasting

Molten Salt Furnace
Non-Hazardous Chemicals
Piped In Grit Blast System
Plastic Media Blast
Sand Blast
Steam
Steam Generator
Steel Media Blast
Ultrasonic
Vapor Degreaser
Vibratory Finishing
Water Jet

Fabrication/Repair

Air Conditioning - Freon
Air Conditioning - Lithium Bromide
Antenna Restoration
Armature Rewinding
Asbestos Encapsulation
Babbitting
Bearings
CAD/CAM
- Propulsion
- Propulsion Shaft
- Sheetmetal
- Vertical Internal Grinder
Certified Soldering
Chemical Machining/Milling
Cladding
CNC Burnin Center
CNC Forming/Machining/Milling
CNC Machining - Welding
Coaxial Cable
Compressors
Controllers
Corrosion Control
Cryptographic
Cutting - Oxyfuel
Fabrication/Repair
Cutting - Plasma
Cutting - Water Jet
Plastic Injection
Plastic/Composites

- Pipe Bender
- Plate Cutting
- Printed Circuit Board
- Propeller
- Propeller Machining
Digital & Analog Meters
Drilling
Electrical Systems
Electrical/Electronic Systems
Electro Plating
Electro Plating - Silver
Electronic ATE
Electronic ATE - SPETE
Electronic Systems
Electroplating - Chromium
Electroplating - Copper
Electroplating - Nickel
Electroplating - Silver
EProm/Prom Programming
Fans
Flame Spray
Flexible Machining Cell
Forming/Machining/Milling
Foundry
Foundry - Ferrous
Foundry - Non-ferrous
Generators
Gyroscopes
Heat Exchanger
Heat Treating
Hybrid Microcircuit
Hydraulic Systems
Investment Casting
Laser Marking
Masts
Metal Finishing
Metal Spray
Metal Spray/Metal Buildup
Metrological
Microcomputer based CAD/CAM
Microwave Components
Motors
Optics
Oscilloscopes
Fabrication/Repair
Photo Etching
Plasma Spray
Welding - Auto Arc
Welding - Dabber TIG

Plastic/Rubber Products
Plating - Cadmium
Plating - Chromium
Plating - Copper
Plating - Electro Deposition
Plating - Galvanize
Plating - Hard Chrome
Plating - Nickel
Plating - Precious Metals
Plating - Silver
Plating - Tin/Lead
Plating and Anodizing
Precision Balancing
Precision Grinding
Printed Circuit Board
Propeller
Propeller Balancing
Propulsion Shaft
Pulse & Audio Generators
Pumps
Restoration of NTDS
RF Signal Generators
Robotic Metal Spray
Robotic Welding
Rubber Products
Rudders
Shaft Balancing
Shaft Repair
Shaft Welding Machine
Shafting
Sonar Scan Switches
Spectrum Analyzers
Structural
Switchboards
Test Program Sets
Tool and Die
Transducer Repair
Weapons Elevator
Weapons Foundations
Welding - Arc

Test and Inspection

Hydraulic Systems
Hydrostatic
Instrumentation
Integrated Blade/Vane System
Laser Measuring
Laser Test Range
Liquid Penetrant
Load Test

Welding - Plasma
Welding - TIG, MIG
Winches
Wiring Harness

Test and Inspection

Air Compressor Analyzer Test
Air/Fuel Flow
Anechoic Antenna Test Chamber
Antenna Test Range
Bearing Process
Bonding Test
Calibration
Chemical Analysis
Damage Assessment
Destructive Testing
Dynamometer
Dynamometer - Engine
Dynamometer - Transmission
Dynamometer Testing
Eddy Current
Electrical Systems
Electrical/Electronic Systems
Electron Microscope
Electronic ATE
Electronic ATE - Analog
Electronic ATE - Digital
Electronic ATE - Ditmco
Electronic ATE - GenRad
Electronic Combat Systems
Electronic Systems
Electronic Testing ATE
Fiber Optics
Fluorescent Penetrant
Fluorescent Penetrant -Automated
Fluorescent Penetrant - Manual
Heat Run Test

Magnetic Particle
NDI Magnetic Particle
Nondestructive Testing
Penetrant
Photogrammetry
Pump Test Facility
Pumps Testing
Radar Test
Radiography
Radiography - Gamma
Radiography Calibration
Spectrographic Analysis
Steam - 1200 PSI
Steam - 1500 PSI
Steam - 600 PSI
Steam - Rupture
Steam Testing
Stress
Television Sys. Underwater Camera
Tempest Test
Test Tank
Type II Laboratory
Ultrasonic
Ultrasonic - Manual
Video Inspection Probe
Winch and Ram Test
Winch and Ram Test Facility
Winch Test Facility
Wirope/Cable Tension - 200K lbs.
Wirope/Cable Tension - 200K lbs.
Wirope/Cable Tension - 300K lbs.
X-Ray
X-Ray - Film
X-Ray - Gamma
X-Ray - Real Time

2.3.2 Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility, (PHNSY & IMF) Pearl Harbor, Hawaii

2.3.2.1 OVERVIEW

History/Mission:

- The Navy established a coaling station at Pearl Harbor in 1842.
- It was abandoned in 1870 because of a policy requiring the use of wind for powering naval vessels.
- In 1873 General J.M. Schofield submitted a report recommending the US obtain Pearl Harbor.
- Later that year, a reciprocity agreement was signed allowing Hawaii to ship sugar to the US duty free in exchange for rights to Pearl Harbor and 800 acres of land.
- On 13 May 1908 Congress authorized almost \$3M to establish the Pearl Harbor Naval Shipyard.
- As the largest ship repair facility between the West Coast and the Far East, Pearl Harbor Naval Shipyard plays a significant role in maintaining the Navy's capabilities.

Location:

- The shipyard is situated on the southern shore of the island of Oahu.
- Five miles to the west lies downtown Honolulu.
- Eight miles farther west is the famous tourist attraction, Waikiki Beach.

Size:

- Pearl Harbor NSY & IMF occupies 300 acres, 167 buildings, 34 berths, 4 dry docks, and 3.73M SF of covered work area.
- The facility value is \$1.4B and plant equipment value is \$146M.

Work Force/Payroll:

- As of August 1998, the total civilian work force was 3,303.
- The total military work force was 731.
- The FY98 budget for the shipyard is \$287M.

Transportation Access:

- One major freeway (H-1), two highways (92 and 99).
- One international airport (including inter-island service).
- One shipping harbor provides transportation access.

Environmental Constraints: Pearl Harbor NSY and IMF has an extensive environmental program to ensure compliance with federal, state, and local environmental rules and regulations. The Environmental Division at PHNS & IMF is responsible for ensuring that industrial operations conducted at the facility does not adversely affect the environment, and is directed toward preventing pollution, being proactive with regulators, and protecting natural, historic, and cultural resources. The following programs have been established at PHNS to comply with applicable environmental requirements and protect human health and the environment:

- Clean Water Program - NPDES Permits, Storm Water, Industrial Wastewater, Drinking Water.
- Clean Air Program - Title V Permitted Resources, Title VI Ozone Depleting Substances, Radon
- Hazardous Waste Management - RCRA Compliance, 90-Day HW Packaging Facility.
- Navy Installation Restoration - CERCLA Compliance, IR Sites, SWMU Sites.
- Mixed Waste Management - RCRA Compliance, TSCA Compliance, and DOE Compliance.
- Underground and Aboveground Storage Tanks - UST Removals, Secondary Containment, Storage.
- Oil Management - Used Oil Reclamation, Oil Storage, Oily Waste, and Bilgewater.
- Emergency Planning and Response - Spill Response Team, SARA Title III Reporting, Spill Prevention,
- Environmental Training - RCRA, OSHA, DOT, TSCA.
- Hazardous Waste Minimization Program - Hazardous Material Reuse, Wastestream reduction.
- Asbestos Management - NESHAP Notifications, TSCA Compliance, OSHA Compliance.
- PCB Management - TSCA Compliance, 30-day storage.
- Pollution Prevention - Innovative Technologies, Coolant Recycling, Hydroblasting.
- Solid Waste Management - Metal Recycling, Landfill Disposal, Sandblasting.
- Historic Preservation - Facilities Modifications, State SHPPO Interface.
- Natural Resources - Wetlands, Endangered Species.
- National Environmental Protection Act (NEPA) Documentation - Categorical Exclusions, Environmental Impact Statements, Environmental Assessments.
- Pesticide Management - Pesticide Application, Disposal, OSHA Compliance.

State of Hawaii Environmental rules and regulations affect industrial operations at PHNS. The State Department of Health (DOH) and the Federal Environmental Protection Agency (EPA) conduct frequent inspections in various program areas to ensure compliance with applicable regulations. EPA Region IX also conducts visits to PHNS & IMF as a result of Pearl Harbor Naval Complex being put on the National Priorities List. Regulators issue Notices of Violation citations and/or levy fines for non-compliance of environmental rules and regulations. The State of Hawaii also has separate environmental rules and regulations (Hawaii Revised Statutes and Hawaii Administrative Rules) which PHNS IMF complies with in addition to the federal rules.

Seasonal hurricane threats are also a concern and require planning and preparation during the summer months. Climate at PHNS is favorable for year-round work.

2.3.2.2 TECHNOLOGICAL ENHANCEMENTS:

The Pearl Harbor Naval Base Regional Master Plan has designated the shipyard as the consolidated core area for industrial maintenance in the mid-Pacific. To this end the Intermediate Maintenance Facility was consolidated into the Shipyard earlier this year. This ship maintenance consolidation, along with the decommissioning has of the Fleet's floating dry-dock, have prompted the Shipyard to develop a dry-dock and pier utilization strategy which makes maximum use of its facilities and reduces required facilities upgrades.

The Shipyard's Facilities Strategic Plan is based on the dry-dock/pier utilization strategy as well as a need to reduce maintenance costs through facility consolidation and modernization. A master industrial engineering study is being conducted to recommend facilities and equipment that will minimize material handling and improve industrial processes. Anticipated date of completion for this study is October 1999.

2.3.2.3 COMMODITIES AND PRODUCTS:

Ships

- Accessories and Components
- Armament
- Communications & Electronics
- Electrical
- Fire Control
- GTE Engine
- Mechanical
- Nuclear Engine
- Recip Engine
- Steam Engine
- Sub-surface Hull
- Surface Hull

2.3.2.4 PROCESSES AND TECHNOLOGIES:

Cleaning/Stripping

Citric Acid
Grit Blast
Hazardous Chemicals
Hydroblast
Non-Hazardous Chemicals
Sand Blast
Steam
Steel Media Blast
Ultrasonic
Vapor Degreaser
Water Jet

Fabrication/Repair

CAD/CAM - CNC & NC Programming
CAD/CAM - Engineering Analysis
CAD/CAM - Engineering Design/Drawings
CAD/CAM - Forming/Machining/Milling
CAD/CAM - Sheetmetal
CAD/CAM - Vertical Internal Grinder
Certified Soldering
Class 100,000 Clean Room
CNC Forming/Machining/Milling
Compressors
Cutting - Laser
Cutting - Oxyfuel
Cutting - Plasma
Cutting - Water Jet
Electrical Systems
Electrical/Electronic Systems
Electro Plating
Electronic Systems
Flame Spray
Forming/Machining/Milling
Heat Treating
Hydraulic Systems
Metal Finishing
Metrological
Piping

Fabrication/Repair

Plasma Spray
Plating
Power Distribution
Precision Balancing
Printed Circuit Board
Propeller
Propeller Balancing
Robotic CARC Painting
Robotic Metal Spray
Robotic Metalizing
Robotic Painting
Robotic Welding
Rubber Products
Sheetmetal
Tool and Die
Welding
Welding - Arc
Welding - Dabber TIG
Welding - Plasma
Welding - TIG, MIG
Winches

Test and Inspection

Air/Fuel Flow
Antenna Test Range
Calibration
Chemical Analysis
Damage Assessment
Destructive Testing
Dynamometer
Dynamometer - Engine
Eddy Current
Electrical Systems
Electron Microscope
Electronic ATE - Analog
Electronic ATE - Digital
Electronic ATE - Ditmco
Electronic ATE - GenRad

Test and Inspection

Fiber Optics
Fluorescent Penetrant
Fluorescent Penetrant - Automated
Fluorescent Penetrant - Manual
Hydraulic Systems
Hydrostatic
Laser Measuring
Liquid Penetrant
Magnetic Particle
NDI Magnetic Particle
Nondestructive Testing
Photogrammetry
Radiography
Radiography - Gamma
Radiography - Neutron
Radiography Calibration
Spectrographic Analysis
Steam - 1200 PSI
Steam - 1500 PSI
Steam - 600 PSI
Steam Testing
Test Tank
Type II Calibration Laboratory
Ultrasonic
Ultrasonic - Manual
Video Inspection Probe
Winch & Ram Test
Winch and Ram Test
Wire Rope/Cable Tension
Wirerope/Cable Tension - 200K Lbs.
Wirerope/Cable Tension - 300K Lbs.
X-Ray
X-Ray – Film

2.3.3 Portsmouth Naval Shipyard (NSY), Portsmouth, New Hampshire

2.3.3.1 OVERVIEW

History:

- 1800 Shipyard established - June, 1800
- 1812 War of 1812. Commodore Isaac Hull, first naval officer to command the Portsmouth Naval Shipyard.
- 1848 Steamer SARANAC built. First steam powered vessel constructed at the shipyard.
- 1857 Overhauled USS CONSTITUTION (Old Ironsides).
- 1870 Admiral David G. Farragut died at the shipyard.
- 1884 Survivors of the Greely Arctic Expedition brought to the shipyard.
- 1898 Captured Spanish prisoners are encamped on the shipyard.
- 1905 Russo-Japanese war ended when a Peace Treaty was negotiated and signed on the shipyard.
- 1917 First submarine built in a U.S. Naval Shipyard -- the L-8.
- 1937 First U.S. built with an all-welded steel hull -- SNAPPER
- 1941 First live underwater explosion tests, using operational submarines TAMBOR and TROUT as targets.
- 1942 First U.S. Submarine construction of high tensile steel -- BALAO
- 1944 Established a record for building the greatest number of submarines during a calendar year -- 31 during 1944. Building time per submarine was reduced from 469 calendar days in 1941 to 173 days in 1944.
- 1947 Pioneered in design of 20 submarines to GUPPY types. First completed was ODAX.
- 1948 First snorkel installed in a U.S. submarine -- IREX.
- 1951 First new submarine after World War II incorporating lessons learned during the war - TANG.
- 1953 Launched first truly submersible hull developed using dirigible form, a break-through in hydrodynamic design - ALBACORE - the worlds fastest submarine when built. It included the first remotely operated ballast control system and the first pilot control console.
- 1958 First nuclear powered submarine build in a government shipyard -- SWORDFISH.
- 1961 Completed submarine ABRAHAM LINCOLN, first Polaris missile submarine built at the shipyard.
- 1967 Engineering innovations in JACK to reduce operating noises and to increase power efficiency.
- 1968 Launched deep diving submarine DOLPHIN.
- 1971 Commisioned last new submarine constructed at the shipyard -- SANDLANCE. Took on new mission to overhaul, repair, and refuel nuclear powered submarines.
- 1980 State of the Art Traducer Repair facility - Building 306 - completed.
- 1983 New Inside Machine Shop - Building 300 - completed.
- 1988 New Engineering Facility - Building 86A - completed.
- 1992 State of the Art Dry Dock No. 2 Refueling Complex completed.
- 1995 Hosted commissioning of Trident submarine - MAINE.
- 1996 State of the Art Hazardous Waste Storage Facility completed.

Mission: To provide quality overhaul, refueling, modernization, and repair of nuclear submarines and related products in a safe, timely, and cost-effective manner. Significant among the many functions performed is:

- Navy's lead shipyard for planning and conducting SSN 688 Class submarine depot modernization period availability.
- Navy's lead shipyard for planning and conducting SSN 688 Class submarine engineered overhauls.
- Navy's lead shipyard for planning and maintenance of specific deep submergence vessels.
- Navy SSN 688 Class submarine inactivation site.
- Conducting cost-effective and on-schedule off-site selected restricted availability Direct Support of nuclear submarine homeport life cycle maintenance, including conducting upkeep, assisting Naval Submarine Support Facility/Intermediate Maintenance Activities, performing "tiger team installations and emergency ship repairs.
- Regional maintenance support for the Northeast region (Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, and New Jersey)
- Navy's availability planning and engineering (SHAPEC) activity for attack and special mission submarines.
- Designing and incorporating special mission capability on new construction and submarines in overhaul.

Location: The Portsmouth Naval Shipyard is located about 50 miles north of Boston, Massachusetts, at the southernmost tip of Maine. The shipyard is on an island in Kittery, Maine, across from Portsmouth, New Hampshire, near the mouth of the Piscataqua River.

Size:

- The shipyard encompasses about 297.45 acres including the main base and a non-contiguous family housing site.
- The total number of buildings is 318, with nearly 4 million square feet of space.
- This total includes 49-ship repair/overhaul building with 1,509,512 square feet.
- The shipyard has three dry docks ranging up to SSBN and SSN 688 Class capability and 6,224 lineal feet of berthing.
- The berthing is comprised of submarine berths (of varying class capability) ranging from only parking capability with no services to repair berths with total repair and test capabilities, plus berths for yard and service craft.
- The facilities current plant value is almost \$1.5B. Plant equipment is valued at \$96M.
- Main Base: 272.72 acres, 217 buildings.
- Family Housing Site: 24.73 acres, 101 buildings.

Work Force/Payroll: The civilian work force population at Portsmouth NSY has decreased to the current level of approximately 3,335 permanent employees. The military work force totals 53 (not including forces afloat).

- Civilian payroll for FY97 is \$210.2M.

Transportation Access:

- Interstate 95 1.5 miles

- Airports: Portsmouth, New Hampshire at Pease Tradesport, 4 miles
Manchester, New Hampshire, 46 miles
Portland, Maine, 47 miles
Boston Massachusetts, 54 miles
- Seaports: Portsmouth, New Hampshire, 2 miles
Portland, Maine, 29 miles
Boston, Massachusetts, 52 miles
- Cargo Rail Portsmouth, New Hampshire, 2 miles
Terminals: Haverhill, Massachusetts, 33 miles

Environmental Programs: The following federal laws and regulations common to other DOD installations and State of Maine laws and regulations are applicable to operations at the shipyard.

- Air pollution control laws and air pollution control regulations.
- Hazardous waste management regulations.
- Oil discharge prevention and pollution control act.
- Regulations for registration, installation, operation and closure of underground oil storage facilities.
- Regulations for underground tanks.
- Rules relating to drinking water, Department of Human Services, Division of
- Health Engineering.
- Water pollution control law.
- 1984 hazardous and solid waste amendment regulations.

Portsmouth Naval Shipyard operates under, or has applied for, the following permits and licenses:

- EPA Hazardous and Solid Waste Amendment Corrective Action Permit.
- EPA toxic release inventory.
- EPA NPDES permit.
- EPA storm water permit.
- Town of Kittery effluent limitations for Portsmouth Naval Shipyard.
- State of Maine air emission license.
- State of Maine hazardous waste storage facility Part B permit.
- State of Maine water discharge permit.
- State biomedical waste generator registration.
- State solid waste transfer facility permit.
- U.S. Fish and Wildlife Service Federal Migratory and Bird Permit.
- Wetland Alterations permit (dredging) under the Natural Resources Protection Act.
- U.S. Coast Guard and EPA approved oil and hazardous substance spill response plan.

Current Physical Conditions of the Environment: Because the shipyard is an island, all hazardous waste and petroleum product spills are of great concern due to the potential to discharge into the surrounding navigable waters. The handling of petroleum products, discharges to the sanitary sewer and National Pollutant Discharge Elimination System (NPDES) permitted discharges are monitored closely for compliance and their effect on the environment. The shipyard has a qualified on-scene operations spill response team and its own equipment, including an oil skimmer to respond to oil spills and hazardous material releases.

The shipyard is currently undergoing studies concerning hazardous waste contamination from past disposal operations on the shipyard. Preliminary studies have already been conducted and interim corrective measures are being considered prior to cleanup phase actions. It is certain that the contamination that exists poses no immediate danger to life and health of personnel and the environment itself. At present, a contractor conducted remedial investigation feasibility study, of both onshore and offshore sites, is nearly complete, which will provide a more thorough assessment of the terrestrial and estuarine environment. Our technical review committee, composed of EPA, local community representatives, and the State of Maine personnel, has been converted to a Restoration Advisory Board (RAB). The purpose of the RAB is to review technical reports, monitor progress, provide a mechanism for community input, and provide a mechanism to keep everyone current on the studies being conducted.

The shipyard is located in an ozone moderate non-attainment area. The Piscataqua River with strong tidal flows surrounds the shipyard. All the waters surrounding the shipyard are used for both recreational and commercial uses, including lobstering.

2.3.3.2 TECHNOLOGICAL ENHANCEMENTS

Portsmouth Naval Shipyard, as the most experienced naval shipyard in submarine design, construction, modernization, and maintenance, is diversifying in the very deep ocean submersible and special operations arenas. We are currently the planning yard for the Navy's deepest diving submarine and submersible as well as other scientific research, defense prototype testing and submerged rescue platforms. We are developing advance technologies and knowledge associated with this environment, including robotics, lighting, compensating systems, manipulators, search sonar, laser communications, material studies, thermal electric cooling and composites. Our goal is to become the Navy's repository for advance engineering, corporate knowledge, history, and first-hand experience of undersea programs.

Manufacturing and Repair Techniques and Processes:

Specialized industrial shipyard capabilities include refurbishment/servicing/testing facility for the following:

- Transducer hydrophones (East Coast certified depot).
- Towed line arrays (East Coast certified depot).
- Submarine antenna and communications buoys (Navy certified depot).
- Ships service motor generator (East Coast certified depot).
- Submarine shaft and propulsion components.
- Submarine valve and pump
- Submarine battery fill/charge/test/installation (East Coast certified depot).

Also:

- Design/manufacture/shipboard application of close tolerance automated cutting and welding machines.
- Level 1/SUBSAFE high quality automated fastener manufacturing, inspection, testing cell
- Extensive rubber and plastics components manufacturing, refurbishment (including laboratory services).
- Precision optical alignment of critical structural components and hull/hull cut mapping with photogrammetry and electrical theodolites.
- Bow dome refurbishment (including booting/rebooting) reinstallation associated special hull treatment replacement and hull preservation systems.
- Level 1/SUBSAFE material inspection (Navy certified depot).

2.3.3.3 COMMODITIES AND PRODUCTS

Automotive Equipment

Engine
Hull & Chassis
Support Equipment

Construction Equipment

Communications
Electronics
Engine
Hull & Chassis

Communications/Electronics

Accessories and Components
Electronics
General Purpose
Radar
Shelter/Housing
Support Equipment

General Support Equipment

Accessories and Components
Machine Tools
Power Plant/Generator Set GTE
Power Plant/Generator Set Recip
Support Equipment
Troop Support Equipment

Missile

Support & Launch
Surface Command & Control

Ships

Accessories and Components
Armament
Communications & Electronics
Electrical
Fire Control
General Purpose
Mechanical
Nuclear Engine
Recip Engine
Sub-surface Hull
Surface Hull

2.3.3.4 PROCESSES AND TECHNOLOGIES:

Cleaning/Stripping

Abrasive Blast
Aluminum Antenna Blasting
Asbestos Removal
Chemical
Citric Acid
Enzyme Tank
Freon
Glass Media Blast
Grit Blast
Hazardous Chemicals
Hydroblast

Cleaning/Stripping

Mineral Grit Blasting
Molten Salt Furnace
Non-Hazardous Chemicals
Plastic Media Blast
Sand Blast
Steam Generator
Steel Media Blast
Ultrasonic
Vapor Degreaser
Vibratory Finishing
Water Jet

Fabrication/Repair

Air Conditioning - Freon
Air Conditioning - Lithium Bromide
Drilling/Lathe/Punch
Antenna Restoration
Armature Rewinding
Asbestos Encapsulation
Bearings
Blade/Vane
Boiler
Cable Assembly
Cable Installation
CAD/CAM
- CNC & NC Machining
- CNC & NC Programming
- Engineering
- Engineering Analysis
- Engineering Design/Drawings
- Forming/Machining/Milling
- Pipe Bender
- Plate Cutting
- Printed Circuit Board
- Propulsion Shaft
- Rubber Shop
- Sheetmetal
Certified Soldering
Chemical Forming/Machining/Milling
Class 100,000 Clean Room
CNC Forming/Machining/Milling
CNC Machining - Welding
Coaxial Cable
Controllers
Cryptographic
Cutting - Oxyfuel
Cutting - Plasma
Cutting - Water Jet
Digital & Analog Meters
Drilling
Electrical Systems
Electrical/Electronic Systems
Electro Plating
Electronic ATE
Electronic ATE - SPETE
Electronic Systems

Fabrication/Repair

Electroplating - Chromium
Electroplating - Silver
Fans
Fiber Optics
Flame Spray
Flexible Machining Cell
Forming/Machining/Milling
Generators
Gyroscopes
Heat Exchanger
Heat Treating
Hybrid Microcircuit
Hydraulic Systems
Metal Finishing
Metal Spray
Metal Spray
Metal Spray/Metal Buildup
Metrological
Microwave Components
Motors
Optics
Oscilloscopes
Photo Etching
Piping
Plasma Spray
Plastic/Composites
Plate Cutting
Plating - Electro Deposition
Plating - Precious Metals
Plating - Silver
Power Distribution
Power Meters
Precision Balancing
Precision Grinding
Printed Circuit Board
Propeller
Propeller Balancing
Pulse & Audio Generators
Pumps
RF Signal Generators
Robotic Welding
Rubber Products
Rudders

Fabrication/Repair

Shaft Balancing
Shaft Repair
Shaft Welding Machine
Shafting
Sonar Scan Switches
Spectrum Analyzers
Structural
Switchboards
Test Program Sets
Tool and Die
Weapons Foundations
Welding - Arc
Welding - Auto Arc
Welding - Electron Beam
Welding - Laser
Welding - Plasma
Welding - TIG, MIG
Welding - TIG, MIG
Winches
Wiring Harness

Test and Inspection

Air/Fuel Flow
Antenna Test Range
Bearing Process
Bonding Test
Calibration
Chemical Analysis
Destructive Testing
Dynamometer - Engine
Eddy Current
Electrical Current
Electrical Systems
Electrical/Electronic Systems
Electronic ATE
Electronic ATE - Analog
Electronic ATE - Digital
Electronic ATE - Ditmco
Electronic ATE - GenRad
Electronic Combat Systems

Test and Inspection

Electronic Systems
Electronic Testing ATE
Fiber Optics
Fluorescent Penetrant
Fluorescent Penetrant - Manual
Heat Run Test
Hydraulic Systems
Hydrostatic
Hyperbaric Chamber
Instrumentation
Laser Measuring
Liquid Penetrant
Load Test
Magnetic Particle
NDI Magnetic Particle
Nondestructive Testing
Pump Test Facility
Radar Test
Radiography
Radiography - Gamma
Radiography Calibration
Spectrographic Analysis
Steam - 600 PSI
Steam - Rupture
Stress
Television Sys. Underwater Camera
Tempest Test
Test Tank
Ultrasonic
Ultrasonic - Automated
Ultrasonic - Manual
Video Inspection Probe
Wierope/Cable Tension - 200K lbs.
Wierope/Cable Tension - 300K lbs.
X-Ray
X-Ray - Film
X-Ray - Real Time

2.3.4 Puget Sound Naval Shipyard (NSY), Bremerton, Washington

2.3.4.1 OVERVIEW

History:

- Puget Sound Naval Shipyard was established in 1891 as a naval station.
- During World War I, the shipyard built 25 subchasers, six submarines, two minesweepers, seven seagoing tugs, and two ammunition ships, as well as 1,700 small boats.
- During World War II, the shipyard's primary effort was the repair of battle damage to ships of the US fleet and allied fleets
- Following World War II, the shipyard engaged in an extensive program of modernizing carriers, including conversion of conventional flight decks to angled decks.
- During the Korean conflict, the shipyard entered an era of new construction with the building of a new class of guided missile frigates.
- In 1961 the shipyard was designated as a repair facility for submarines.
- In 1965 the shipyard was designated as a nuclear capable repair facility.
- In 1987, the shipyard became the homeport for the nuclear carrier USS NIMITZ (CVN 68).

Mission: Today Puget Sound Naval Shipyard is the largest and most diverse shipyard on the West Coast, as well as being the northwest's largest naval shore activity. Additionally, it is one of the largest industrial facilities in the State of Washington, both in terms of plant investment and in the number of civilians employed. The shipyard mission is wide ranging in that it possesses the capabilities to overhaul and repair all types and sizes of ships of the United States Navy while also serving as home port for a nuclear aircraft carrier, one nuclear cruiser and four fleet support ships (four fast combat support ships (AOE)). The shipyard is the home of the NAVSEA sponsored Ocean Engineering Department, a unique research and development capability. The shipyard's other significant capabilities include alteration, construction, deactivation, and dry-docking of all types of naval vessels. Puget Sound NSY is the only shipyard performing ship recycling. The shipyard has a state-of-the-art emergency power generating system capable of providing backup power for all ships. In addition to in-yard work, the shipyard has a very active program of providing repair teams to accomplish on-site repair work on a variety of naval ships at their home port locations. Puget Sound Naval Shipyard has been recognized as the Navy's best installation worldwide and is the recipient of the 1991 and 1995 Commander-in-Chief's Installation Excellence Award.

Location:

- The shipyard is located adjacent to the city of Bremerton in Western Washington on the West Side of Puget Sound.
- Major cities within proximity to the shipyard include Seattle (one hour by ferry) and Tacoma (approximately 30 miles by road).
- The shipyard is also located within 50 miles of such DOD installations as the US Navy's TRIDENT Submarine Base, Bangor, WA; Fort Lewis Army Base, and McChord Air Force Base, both in Tacoma, WA.

Size:

- The shipyard covers 344 acres of hard land and 338 acres of submerged land.
- Included in the complex are nine piers, with 12,300 lineal feet of deep water pier space, four moorings, 382 buildings and six dry-docks, of which Dry-dock No. 6 is the largest on the West Coast and is suitable for aircraft carriers.
- Facility and equipment values are as follows:

	Acquisition Cost	Accumulated Depreciation	Current Value
Land	\$ 15,618,960		
Buildings & Structures	\$442,430,165	(\$211,026,734)	\$231,403,431
Plant Equipment	\$249,815,135	(\$136,757,137)	\$113,058,071
Production Equipment	\$ 54,755,135	(\$ 32,784,703)	\$ 21,970,432

- A natural harbor and temperate climate provide deep, clear water and ice-free moorage for any size of naval vessel throughout the year.

Work Force/Payroll:

- Puget Sound NSY has a civilian work force of 8,862 and a military population of over 6,500 including 115 assigned to the shipyard and 6,400 attached to Homeport ships.
- The annual payroll for both civilian and military personnel is \$900 million.

Skill Base:

- Approximately 64 percent of the shipyard's work force are skilled, 19 percent are semi-skilled, and 2 percent is unskilled and the engineering force is 15 percent.

Transportation Access:

- Primary access to/from the shipyard is Highway 16.
- Interstate 5, using Route 16 to Interstate 5 interchange - 34 miles.
- Sea Ports of Embarkation
 - Port of Tacoma. Via Route 16 to Interstate 5 using Exit 136 - 37 miles to Pierce County Terminal Port Dock.
 - Port of Seattle. Via Route 16 to Interstate 5 using Exit 163 - 68 miles to Matson Lines Pier 18 Gate 4.

- Air Ports of Embarkation
 - SEATAC International Airport. Via Route 16 to Interstate 5 using Exit 152 - 60 miles.
 - National Airport Bremerton. Via Route 16 to Route 3 - 13 miles.
 - McChord Air Force Base. Via Route 16 to Interstate 5 using Exit 127 - 41 miles.
- Cargo Rail Service - 0 miles.
 - Rail marshaling on the West Side of the shipyard with daily service by the Burlington Northern Railroad. (No service on weekend and holidays without prior request.)

Environmental Constraints:

Affects of Regulatory Constraints:

- National Environmental Pollution Act, (NEPA)
- Comprehensive Environmental Response, Compensation and Liability Act, (CERCLA)
- Superfund Amendments and Reauthorization Act, (SARA)
- Federal and State waste and material handling regulations, (i.e., RCRA and TSCA regs)
- National Pollution Discharge Elimination System (NPDES), Permit requirements
- Puget Sound Air Pollution Control Agency, (PSAPCA), regulations
- Municipal sewer and solid waste landfill discharge restrictions
- State Waste Discharge permit (CWA)
- Oil/hazardous substance storage, handling and spill release regulations
- State Underground Storage Tank Regulations
- NPDES requirements have caused increased leaning within the Controlled Industrial Area (CIA) and has resulted in ongoing dry-dock modifications in order to maintain compliance.
- Puget Sound Naval Shipyard was placed on the National Priorities List in 1994 with nine separate contaminated sites.

Condition of surrounding environment:

- Sinclair Inlet is listed as a "Class A" water body, (i.e., fishable/swimmable).
- The Puget Sound Interstate Air Quality Control Area is listed as "attainment area" for Clean Air Act, air quality standards.
- Surrounding, adjacent inland areas are made up of residential housing and small businesses.

2.3.4.2 TECHNOLOGICAL ENHANCEMENTS

Manufacturing Techniques/Processes:

- Metal Preparation Facility:
 - Existing facility undergoing major refurbishment and updating.
 - Will be the Navy's capability for diamond plating of lapping tools.
 - Electroplating processes being upgraded to include chrome, nickel, cadmium copper and zinc plating.
 - A new parts cleaning area has already been completed.

- **Plate Cutting Capabilities:**
 - A new ESAB plate cutting system is being purchased and installed.
 - Consists of two identical CNC controlled thermal-cutting systems (gantries) and three 36 foot long by 25 foot wide cutting tables.
 - Will enhance shipyard capabilities for cutting plate and automate some manual methods currently employed in manufacturing operations.
 - Each cutting system consists of three oxy-fuel cutting torches, two plasma cutting torches, a rotary two sided beveling torch, and pneumatic and plasma marking system.
 - Tables capable of holding stock size 33 foot by 20 foot plate for cutting and beveling operations without external support.
 - System designed for plasma cutting up to 4-inch thick plate and oxy-fuel cutting up to 8-inch plate.
 - Shop now able to cut 33-foot plates in one operation, previously limited to 20 feet. This includes bevel cut 20 foot by 33 foot plates, an operation done by hand in the past.
 - Plasma cutting can be done underwater with the new system to greatly reduce the noise and fumes associated with plasma cutting.

Repair Techniques/Processes:

- **Powder Coating System**
 - Shipyard currently procuring powder-coating system to be used to electrostatically powder coat ship's parts that are currently coated using conventional solvent based liquid paints.
 - System comprised of a powder-coating booth, preheat and cure oven, and an overhead materials handling system. The powder-coating booth has an automated conveyor with two operator spray stations. The material handling system is designed to accommodate parts up to 4 feet wide by 4 feet tall by 6 foot long and weighing up to 500 pounds. Larger sized parts can be processed using material racks or other material handling equipment.

2.3.4.3 COMMODITIES AND PRODUCTS:

Automotive Equipment

Accessories and Components

Armament

Communications

Electronics

Construction Equipment

Communications

Electronics

Engine

Hull & Chassis

Automotive Equipment

Engine

Fire Control

Hull & Chassis

Support Equipment

Missile

Support & Launch

Surface Command & Control

Communications/Electronics

Accessories and Components
Electronics
General Purpose
Power Plants GTE
Power Plants Recip
Radar
Shelter/Housing
Support Equipment

General Support Equipment

Accessories and Components
Machine Tools
Power Plant/Generator Set GTE
Power Plant/Generator Set Recip
Support Equipment
Troop Support Equipment

Ordnance

Accessories and Components
Engines
Small Arms

Ships

Accessories and Components
Armament
Communications & Electronics
Electrical
Fire Control
General Purpose
GTE Engine
Mechanical
Nuclear Engine
Recip Engine
Steam Engine
Sub-surface Hull
Surface Hull

2.3.4.4 PROCESSES AND TECHNOLOGIES:**Cleaning/Stripping**

Abrasive Blast
Abrasive Flow
Asbestos Removal
Chemical
Citric Acid
CO2 Blast
Enzyme Tank
Flash Paint Removal
Freon
Glass Media Blast
Grit Blast
Hazardous Chemicals
Hydroblast

Fabrication/Repair

Air Conditioning - Freon
Air Conditioning - Lithium Bromide
Antenna Restoration
Armature Rewinding
Asbestos Encapsulation
Babbitting
Bearings

Cleaning/Stripping

Mineral Grit Blasting
Molten Salt Furnace
Non-Hazardous Chemicals
Plastic Media Blast
Sand Blast
Steam
Steam Generator
Steam Generator Chemical Cleaning
Steel Media Blast
Ultrasonic
Vapor Degreaser
Vibratory Finishing
Water Jet

Fabrication/Repair

Cutting - Laser
Cutting - Oxyfuel
Cutting - Plasma
Cutting - Water Jet
Digital & Analog Meters
Drilling
Electrical Systems

Fabrication/Repair

Blade/Vane

Boiler

Cable Assembly

Cable Installation

CAD/CAM

- Artwork-Flat Wire Cables
- Artwork-Printed Circuit Board
- Auto Propeller Machining
- CNC & NC Programming
- Drilling/Lathe/Punch
- Engineering
- Engineering Analysis
- Engineering Design/Drawings
- Forming/Machining/Milling
- Pipe Bender
- Plate Cutting
- Printed Circuit Board
- Propeller Machining
- Propulsion Shaft
- Sheetmetal
- Vertical Internal Grinder

Ceramics

Certified Soldering

Cladding

Class 100,000 Clean Room

CNC Burnin Center

CNC Forming/Machining/Milling

CNC Machining - Welding

CNC Welding - Machining

Coaxial Cable

Compressors

Computer Based CAD/CAM Systems

Controllers

Corrosion Control

Cryptographic

Optics

Oscilloscopes

Photo Etching

Piping

Plasma Spray

Plastic Injection

Plastic/Composites

Plastic/Rubber Products

Plating

- Cadmium
- Chromium
- Copper
- Electro Deposition

Fabrication/Repair

Electrical/Electronic Systems

Electro Plating

Electronic ATE

Electronic ATE - SPETE

Electronic Systems

Electroplating - Chromium

Electroplating - Copper

Electroplating - Nickel

Electroplating - Silver

Electroplating - Tin

EProm/Prom Programming

Fans

Fiber Optics

Flame Spray

Flexible Machining Cell

Forming/Machining/Milling

Foundry

Foundry - Ferrous

Foundry - Non-ferrous

Generators

Gyroscopes

Heat Exchanger

Heat Treating

Hybrid Microcircuit

Hydraulic Systems

Investment Casting

Laser Punch

Masts

Metal Finishing

Metal Spray

Metal Spray/Metal Buildup

Metrological

MG Set Repair

Microwave Components

Motors

Sonar Scan Switches

Spectrum Analyzers

Structural

Switchboards

Test Program Sets

Tool and Die

Transducer Repair

Weapons Elevator

Weapons Foundations

Welding

Welding - Arc

Welding - Auto Arc

Welding - Dabber TIG (CYBER)

Fabrication/Repair

Plating

- Galvanize
- Hard Chrome
- Nickel
- Precious Metals
- Silver
- Tin
- Tin/lead
- Zinc

Plating and Anodizing

Power Distribution

Power Meters

Precision Balancing

Precision Grinding

Printed Circuit Board

Propeller

Propeller Balancing

Propeller Manufacturing Facility

Pulse & Audio Generators

Pumps

Restoration of NTDS

RF Signal Generators

Robotic - Welding

Robotic Metal Spray

Robotic Welding

Rubber Products

Rudders

Shaft Balancing

Shaft Repair

Shafting

Electronic ATE - Digital

Electronic ATE - Ditmco

Electronic ATE - GenRad

Electronic Combat Systems

Electronic Testing ATE

Test and Inspection

Fiber Optics

Fluorescent Penetrant

Fluorescent Penetrant - Automated

Heat Run Test

Hydraulic Systems

Hydrostatic

Instrumentation

Integrated Blade/Vane Systems

Laser Measuring

Laser Test Range

Fabrication/Repair

Weapons Foundations

Welding - Electron Beam

Welding - GWS

Welding - Laser

Welding - Plasma

Welding - TIG, MIG

Winches

Test and Inspection

Air Compressor Analyzer Test

Air/Fuel Flow

Antenna Test Range

Bearing Process

Bonding Test

Calibration

Chemical Analysis

Damage Assessment

Destructive Testing

Dynamic Pressure Test

Dynamometer

Dynamometer - Engine

Dynamometer - Transmission

Dynamometer Testing

Eddy Current

Electrical Systems

Electrical/Electronic Systems

Electron Microscope

Electronic ATE

Electronic ATE - Analog

X-Ray

X-Ray - Film

X-Ray - Gamma

X-Ray - Real Time

Video Inspection Probe

Wirerope/Cable Tension - 200K lbs.

Wirerope/Cable Tension - 300K lbs.

Test and Inspection

Liquid Penetrant
Load Test
Magnetic Particle
NDI Magnetic Particle
Nondestructive testing
Penetrant
Photogrammetry
Pump Test Facility
Radar Test
Radiography
Radiography - Gamma
Radiography Calibration
Spectrographic Analysis
Steam - 1200 PSI
Steam - 1500 PSI
Steam - 600 PSI
Steam - Rupture
Steam Testing
Television System/Underwater Camera
Tempest Test
Test Tank
Type II Calibration Laboratory
Ultrasonic
Ultrasonic - Manual